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## METAL-PLATE-CONNECTED WOOD TRUSSES

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# IR 23-4

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### References:

2007/2010 California Building Code, Title 24, Part 2,  
Chapters 23 and 17A

ANSI/TPI 1  
ICC ES AC306

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### Discipline: Structural

This Interpretation of Regulations (IR) is intended for use by the Division of the State Architect (DSA) staff, and as a resource for design professionals, to promote more uniform statewide criteria for plan review and construction inspection of projects within the jurisdiction of DSA which includes State of California public elementary and secondary schools (grade K-12, community colleges), and state-owned or state-leased essential services buildings. This IR indicates an acceptable method for achieving compliance with applicable codes and regulations, although other methods proposed by design professionals may be considered by DSA.

This IR is reviewed on a regular basis and is subject to revision at any time. Please check the DSA web site for currently effective IRs. Only IRs listed in the document at <http://www.dgs.ca.gov/dsa/Resources/IRManual.aspx> at the time of plan submittal to DSA are considered applicable.

**Purpose:** This Interpretation of Regulations (IR) clarifies the criteria and process under which the Division of the State Architect (DSA) will evaluate, accept for use, and establish requirements for inspection of manufactured wood trusses on projects under DSA jurisdiction.

**Note:** Frequently used terms are defined in the glossary, Section 9 of this IR.

**Scope:** This IR is applicable only to metal-plate-connected (MPC) wood trusses.

**1. Acceptance Criteria:** MPC wood trusses shall be designed, and manufactured in accordance with ANSI/TPI 1-2002 (2007 for projects submitted under the 2010 CBC).

- Manufacture of MPC wood truss shall comply with ANSI/TPI 1, Chapter 3. Manufacturers shall maintain a quality control and quality assurance program with periodic audits by an approved inspection agency per ANSI/TPI 1.
- The metal connector plates must have a valid evaluation report issued by ICC-ES or other qualified evaluation organizations per DSA [IR A-5](#). The evaluation report must indicate conformance with ANSI/TPI 1.
- The manufacturing of metal connector plates shall comply with ANSI/TPI 1, Chapter 4. Manufacturers shall maintain a quality control and quality assurance program with periodic audit in accordance with ANSI/TPI 1 and the evaluation report.
- The manufacturing of trusses must be inspected per Section 5 below.

**2. Approval Process:** The approval of manufactured wood trusses for use on a specific project is a four-phase process. There are specific requirements and responsibilities for the truss manufacturer, and the architect or structural engineer in general responsible charge (project design professional) in each phase. The four phases and the key players involved are as follows:

- **Review and Approval of Construction Documents (Section 3 below):**  
Project Design Professional, and DSA
- **Review and Approval of Truss Submittal Package (Section 4 below):**  
Project Design Professional, Manufacturer, and DSA
- **Manufacturing and Special Inspection of Wood Trusses (Section 5 below):**  
Manufacturer and Fabrication Special Inspector
- **Field Installation (Section 6 below):** Project Inspector

The process outlined in this IR is a deferred approval process in compliance with Title 24, Part 1 (the California Administrative Code [CAC]), Section 4-317(g). As an option, the truss submittal package as described in Section 4 below may be included with the construction documents in the first phase. In this case, the review and approval of construction documents and truss submittal package will be combined.

**3. Review and Approval of Construction Documents.** This phase occurs before a project construction contract is awarded to a qualified wood truss manufacturer.

The steps and requirements for this phase are as follows:

**3.1** Project design professional prepares construction documents (plans and specifications) for the project. In addition to the requirements in CBC Section 2303.4.3, Item 1 (2303.4.3.1 in 2010 CBC), the portion of the construction documents pertaining to wood trusses shall also include the following:

- Structural framing plan, including layout of wood trusses, depths, and all supporting elements
- Loading diagrams for all wood trusses in accordance with CBC Section 2303.4.3, Item 1-1.2 (2303.4.3.1 in the 2010 CBC, and 2303.4.1.1, Item 5).
- Detailed requirements for the transfer of loads and anchorage of each truss to the supporting structure per CBC Section 2303.4.1.6 (2303.4.4 in the 2010 CBC).
- Detailed requirements for truss top chord dimensions, orientation, and ability to receive plywood diaphragm nailing.
- Project specifications shall require that wood truss fabricator(s) comply with Section 1 of this IR. The project design professional should closely coordinate wood truss design (including all connections, non-standard products, and details) with a qualified fabricator prior to the submittal of contract documents for DSA review.
- Project specifications and the Statement of Tests and Special Inspections (CBC Sections 1704A.1.1 and 1705A) shall include inspection requirements for wood trusses per Section 5 of this IR.

**3.2** Project design professional submits an application and construction documents to DSA for review.

**3.3** After the DSA plan review process is completed, the approved construction documents will bear the DSA identification stamp with the initials of the plan reviewers.

**4. Review and Approval of Truss Submittal Package.** This phase may occur after the project has been bid and the contract for the fabrication of the wood trusses has been awarded to a qualified manufacturer as defined in Section 1 of this IR. The steps and requirements for this phase are as follows:

**4.1** Manufacturer, working in a fully coordinated effort with the project design professional, prepares the truss submittal package for DSA approval, in accordance with the requirements of CBC Section 2303.4.1.4 (2303.4.3 in the 2010 CBC) and DSA approved project construction documents.

**4.1.1** If the requirements in the approved construction documents (see Section 3 above) were altered during the preparation of the truss submittal package, the project design professional must prepare and submit a change order or Construction Change Document to the DSA for review in accordance with IR A-6.

These changes may include, but are not limited to, truss depths, layout, framing plans, loads, truss anchorage, etc.

**4.2** The manufacturer's truss submittal package shall include truss design drawings, calculations, and truss placement diagrams per CBC Sections 2303.4.1.2, 2303.4.1.3, and 2303.4.1.4 (Sections 2303.4.1.1, 2303.4.2 and 2303.4.3 respectively in the 2010 CBC). The truss design drawings shall be prepared, signed, and stamped by the fabricator's California registered professional engineer per CBC Section 2304.1.2 (2303.4.1.4.1 in the 2010 CBC) and Section 4-316(c) in Title 24, Part 1.

**4.2.1 Truss Design Drawings.** In addition to the items in Section 4.2 above, the truss design drawings shall include the following:

- Truss profile with overall dimensions, roof slopes, member size, panel point dimensions, size of connection plate, locations of bracing point, and hangers if any.
- Material specifications for members, plates, listing of current evaluation report for metal side plates, and hangers if any.
- Typical plate connection details defining alignment of plate and locating dimensions relative to the centerline of the joint. The centerline of joint is the interception of the inside edge of the chord member with the centerlines of the webs.
- Details shall specify treatment of plates where knots occur within the joint.
- Manufacturer's truss blocking panels, if required by design.
- Gable end trusses, if used over walls.

**4.2.2 Truss Calculations:** In addition to the items in Section 4.2 above, the truss calculations shall include the following:

- Summary of load combinations analyzed.
- Summary of maximum member loads and reactions based upon controlling load combination. Controlling load combination shall be identified for each member and reaction.
- Member design.
- Required bearing areas and dimensions.
- Metal side plate sizes based upon the defined plate manufacturer.
- Metal side plate evaluation report.
- Calculation of plate size and actual area required at each member of eccentric joints for the maximum member loads summarized above.
- If calculations were performed by the use of a computer program, user manual shall be available to the DSA upon request. The DSA may, at its discretion, request verification of the program's output results by other independent means, such as hand calculations.

**4.3** The manufacturer submits the truss submittal package to the project design professional for review and approval. This step may take multiple exchanges between the project design professional and the manufacturer to finalize the submittal package for submittal to the DSA.

**4.4** When the project design professional approves the submittal package, he/she shall provide a signed and stamped Statement of General Conformance and submit it to

the DSA for approval in accordance with Title 24, Part 1, Section 4-317(g). For additional information on the Statement of General Conformance, see DSA IR A-18.

The project design professional shall submit a set of truss design drawings in the submittal package to the DSA.

- 4.5** If the DSA reviews the submittal package and determines that they are in conformance, the DSA stamps the truss design drawings as approved. The stamped set of the truss design drawings and the remainder of the submittal package will be scanned into the DSA database and then returned to the project design professional who shall forward a copy to the manufacturer. Additional copies of the DSA stamped truss design drawings may be available to the project design professional by arrangement with the DSA Regional Office.

This step may involve a back-check review if the submittal package was not approved. The project design professional shall coordinate with the manufacturer to resolve DSA plan check comments (as noted on the mark-up set of the submittal package) and schedule a back-check appointment with DSA. Bring a set of corrected submittal package drawings and the original DSA marked-up set to the back-check appointment.

**5. Manufacture and Special Inspection of Wood Trusses:** The manufacture of wood trusses shall not occur prior to DSA approval of the truss submittal package (Section 4 above).

- 5.1** Manufacturer prepares shop drawings from the DSA approved construction documents and truss design drawings.

Changes to the approved construction documents and truss design drawings must be reviewed and approved prior to truss fabrication in accordance with Section 7 of this IR.

- 5.2** Manufacturer notifies the project design professional, who will notify the project inspector, and fabrication special inspector of the fabrication schedule. Fabrication may not start without the presence of fabrication special inspector.

- 5.3 Fabrication Special Inspection:** A fabrication special inspector must provide continuous inspection during wood truss fabrication in accordance with CBC Section 1704A.6 and Section 4-333(c) (4-333(d) in 2010 CAC), Title 24, Part 1. This inspection is in addition to and independent of the quality control procedures and inspections by the manufacturer.

- 5.3.1 Qualifications:** The fabrication special inspector must be approved by DSA for each project prior to fabrication. Qualifications include compliance with all the following:

- He/she must be employed by the school district or by an LEA laboratory and approved by DSA for the project, Title 24, Part 1, Section 4-333(c) (4-333(d) in 2010 CAC).
- He/she must have a minimum of 3 years' experience in wood truss fabrication, as either the fabricator's quality control manager or as an inspector employed by an accredited third party quality control agency (QCA).
- Must be at least 25 years of age.

### 5.3.2 Responsibilities:

- **Inspection:** Each truss shall be continuously inspected by the fabrication special inspector during all stages of fabrication. Material grades, dimensions, joint details and all other aspects of truss fabrication shall be thoroughly inspected.
- **Marking:** Each inspected truss shall be stamped with an identification mark by the special inspector. At a minimum the "identification mark" shall include the special inspector's initials and date.
- **Verified Report:** The fabrication special inspector shall furnish a verified report to the project design professional and DSA in accordance with CBC Section 1704A.6.2 (1704A.6.3 in the 2010 CBC).

**6. Field Installation:** During this phase, the wood trusses are installed at the construction site. The steps and requirements for this phase are as follows:

**6.1** Working from the DSA approved construction documents, DSA approved truss submittal package, and any DSA approved construction change documents, the project inspector shall verify truss size, fabrication special inspector's stamp, placement in the field, and all truss installation details including bridging, bracing, connections, etc.

**7. Revisions:** If changes to the DSA approved construction document and/or the DSA truss submittal package are necessary, the fabricator and the project design professional, working together, shall prepare and submit a change order or construction change document to DSA for review in accordance with DSA IR A-6. DSA approval of all changes is required prior to the implementation of the changes.

**8. Lateral Force Resisting System:** When MPC wood truss is used as a drag or collector element in a lateral force resisting system, the plate's design strength derived from or based on static test shall be reduced by 20%.

**9. Glossary:** For clarity and reference, some frequently used terms in this IR are defined below:

#### 9.1 Construction Documents

Project documents pertaining to the construction of the project and submitted to DSA for review prior to construction. These documents may include drawings and specifications for site, architectural, structural, mechanical, electrical, fire and life safety, accessibility and energy features.

#### 9.2 Center of Joint

The centerline of joint is the interception of the inside edge of the chord member with the centerlines of the webs. The intersecting edges of the webs are cut and shaped so that the web center lines will meet at the center of the joint.

#### 9.3 Construction Change Documents

Any changes to the DSA approved construction documents, and/or the DSA approved truss submittal package. See IR A-6.

#### **9.4 Fabrication Special Inspector**

Special inspector who provides continuous inspection during the fabrication of wood trusses. He/she is employed by the school district or by an LEA laboratory and approved by the DSA for the project, Title 24, Part 1, Section 4-333(b) (4-333(c) in the 2010 CAC).

#### **9.5 Project Design Professional**

The architect or structural engineer in "general responsible charge" of a project, Title 24, Part 1, Section 4-316(a)

#### **9.6 Project Inspector**

A DSA certified inspector responsible for inspection for the project. He/she is employed by the school district and approved by the DSA for the project, Title 24, Part 1, Section 4-333(b)

#### **9.7 Truss Design Drawings**

Truss design drawings are prepared, stamped, and signed by the manufacturer's California registered engineer. The truss design drawings shall include as a minimum all the items listed in CBC Section 2303.4.1.2 (2303.4.1.1 in the 2010 CBC). The truss design drawings are part of the Truss Submittal Package.

#### **9.8 Truss Placement Diagram**

Per CBC Section 2303.4.1.3 (2303.4.12 in the 2010 CBC), the truss placement diagram identifies the proposed location for each individually designated truss and references the corresponding truss design drawing. The truss placement diagram shall be provided as part of the truss submittal package, and with the shipment of trusses delivered to the job site. Truss placement diagrams that serve only as a guide for installation and do not deviate from the permit submittal drawings shall not be required to bear the seal or signature of the truss designer.

#### **9.9 Truss Submittal Package**

A package prepared by the truss manufacturer and submitted to the DSA for review through the Project Design Professional. The package shall include all the items prescribed in CBC Section 2303.4.1.4 (2303.4.3 in the 2010 CBC).